

WHAT IS CLAIMED IS:

1. A subterranean apparatus comprising:
a hollow mandrel having an inner diameter defining a passage therethrough;
a packing element arranged about the mandrel; and
a valve functionally associated with the mandrel for selectively controlling flow of fluids through the passage, the valve adapted to engage the mandrel such that rotation between the mandrel and the valve is precluded when the valve is in a closed position.
2. The apparatus of claim 1 wherein the valve further comprises a flapper having a non-circular cross section adapted to selectively engage the mandrel, the mandrel having a non-circular cross section, when the valve is in the closed position.
3. The apparatus of claim 1 wherein the valve further comprises a flapper having at least one tab adapted to selectively engage at least one recession in the mandrel when the valve is in the closed position.
4. The apparatus of claim 3 wherein the valve further comprises a hinge to pivotally attach the flapper to the mandrel.
5. The apparatus of claim 4 wherein the flapper is biased in the closed position by a spring.
6. The apparatus of claim 3 wherein the valve further comprises a seal to sealingly engage the flapper and the mandrel when the valve is in the closed position.
7. The apparatus of claim 6 wherein the seal comprises a bonded seal on the flapper.
8. The apparatus of claim 6 wherein the seal comprises an O-ring on the mandrel.
9. The apparatus of claim 6 wherein the seal comprises an elastomeric sealing element functionally associated with the mandrel.
10. The apparatus of claim 3 wherein the flapper is comprised of non-metallic material.
11. The apparatus of claim 10 wherein the non-metallic material is fiber-reinforced thermoset, fiber reinforced thermoplastic, or structural grade plastic.
12. The apparatus of claim 1 further comprising a central member within the passage of the mandrel, the central member being selectively releasable from the apparatus.
13. The apparatus of claim 12 wherein the central member is releaseably attached to the mandrel by a release mechanism.

14. The apparatus of claim 13 wherein the release mechanism is comprised of shear screws.
15. The apparatus of claim 12 wherein the release mechanism is comprised of shear rings, adjustable spring-loaded detent pins, or rupture disks.
16. The apparatus of claim 1 wherein a central member is adapted to seal the passage of the apparatus against fluid bypass when the central member is within the mandrel.
17. The apparatus of claim 16 wherein the passage allows fluid flow through the apparatus when the central member is released from the mandrel.
18. The apparatus of claim 16 wherein the central member holds a valve open during run-in of the apparatus, the valve having a flapper.
19. The apparatus of claim 18 wherein the flapper has a tab to selectively engage a recess in the mandrel to rotationally lock the flapper and the mandrel when the valve is in the closed position.
20. The apparatus of claim 1 wherein the mandrel has an outer surface, the mandrel having a non-circular cross-section, the packing element having a non-circular inner surface such that rotation between the mandrel and the packing element is precluded, the outer surface of the mandrel and the inner surface of the packing element interfering with one another in rotation.
21. The apparatus of claim 20 wherein the mandrel comprises non-metallic materials.
22. The apparatus of claim 20 in which the mandrel is comprised of a metallic core wound with thermoplastic tape.
23. The apparatus of claim 22 wherein the metallic core is comprised of brass and the tape is reinforced with carbon fiber.
24. The apparatus of claim 20 further comprising an anchoring assembly arranged about the mandrel, the anchoring assembly having a non-circular inner surface such that rotation between the mandrel and the anchoring assembly is precluded.
25. The apparatus of claim 24 wherein the anchoring assembly further comprises:
 - a first plurality of slips arranged about the non-circular mandrel outer surface, the slips being configured in a non-circular first loop such that rotation between the mandrel and the first plurality of slips is precluded by interference between the first loop and the mandrel outer surface;

- a first slip ring surrounding the first plurality of slips to detachably hold the first plurality of slips about the mandrel;
 - a second plurality of slips arranged about the non-circular mandrel outer surface, the second plurality of slips being configured in a second non-circular loop such that concentric rotation between the mandrel and the second loop is precluded by interference between the second loop and the mandrel outer surface; and
 - a second slip ring surrounding the second plurality of slips to detachably hold the second plurality of slips about the mandrel.
26. The apparatus of claim 25 wherein each the first plurality of slips and second plurality of slips each contain a cavity.
27. The apparatus of claim 26 further comprising:
- a first cone arranged about the non-circular outer surface of the mandrel, the first cone comprising a non-circular inner surface such that rotation between the mandrel and first cone is precluded, wherein a second plurality of slips abuts the first cone, facilitating radial outward movement of the slips into engagement with the wellbore wall upon traversal of the first plurality of slips along the first cone;
 - a second cone arranged about the non-circular outer surface of the mandrel, the second cone comprising a non-circular inner surface such that rotation between the mandrel and second cone is precluded, wherein a second plurality of slips abuts the second cone, facilitating radial outward movement of the slips into engagement with the wellbore wall upon traversal of the second plurality of slips along the second cone,
 - the first and second cones each comprising a plurality of channels, each of the plurality of channels being receptive of at least one of the plurality of slips, the channels being arranged such that rotation between the first cone and the first slips is precluded, and the second cone and the second slips is precluded.
28. The apparatus of claim 20 wherein the packing element further comprises a first end element, a second end element, and an elastomer disposed therebetween
29. A method of selectively isolating a portion of a well comprising the steps of:

providing an apparatus having a hollow mandrel with an inner diameter defining a passage therethrough, a packing element arranged about the mandrel, and
a valve functionally associated with the mandrel for selectively controlling flow of fluids through the passage, the valve adapted to engage the mandrel such that rotation between the mandrel and the valve is precluded when the valve is in a closed position;
running an apparatus into a well,
setting the packing element by the application of a force;
selectively controlling a flow of fluid through the apparatus by the valve; and
destructively removing the apparatus including the valve out of the well.

30. The method of claim 29 in which the step of providing an apparatus further comprises providing the apparatus with a flapper having at least one tab, the mandrel having at least one recession, and further comprising:

closing the valve, the at least one tab engaging the at least one recession when the valve is closed.

31. The method of claim 30 further comprising:

sealing the valve against the mandrel when the valve is closed with a seal.

32. The method of claim 30 wherein the step of removing further comprising milling the apparatus out of the well, the flapper of the apparatus being comprised of non-metallic material to facilitate the milling.

33. The method of claim 30 in which the step of providing an apparatus further comprises providing the apparatus with a central member, the method further comprising:
preventing fluid flow through the apparatus by the central member.

34. The method of claim 33 further comprising:

selectively releasing the central member from the passage of the apparatus; and
controlling fluid flow through the apparatus with the valve.

35. The method of claim 34 further comprising:

selectively operating a release mechanism to selectively release the central member.

36. The method of claim 35 in which the step of providing an apparatus includes providing the apparatus with the mandrel having an outer surface and a non-circular cross-section, the packing element having a non-circular inner surface such that rotation between the mandrel and

the packing element is precluded, the outer surface of the mandrel and inner surface of the packing element interfering with one another in rotation.

37. The method of claim 36 further comprising:

locking an anchoring assembly of the apparatus to the mandrel to lock the apparatus in place within the well.

38. A subterranean apparatus comprising:

a hollow mandrel having an inner diameter defining a passage therethrough;

a packing means arranged about the mandrel; and

a valve functionally associated with the mandrel for selectively controlling flow of fluids through the passage, the valve having means for engaging the mandrel such that rotation between the mandrel and the valve is precluded when the valve is in a closed position to facilitate subsequent removal of the apparatus.

39. The apparatus of claim 38 further comprising:

a central member within the passage of the mandrel, the central member having selective releasing means.

40. The apparatus of claim 39 further comprising means for anchoring the apparatus in a wellbore.

41. A flapper valve for use with a downhole tool having a mandrel with at least one recession, comprising:

a valve having a flapper to selectively prevent a flow of fluid through the mandrel; and

a hinge pivotally attaching the flapper to the mandrel, wherein the flapper has at least one tab adapted to selectively engage the at least one recession in the mandrel when the valve is in a closed position.

42. The flapper valve of claim 41 wherein the flapper is biased in a closed position preventing the flow of fluid by a spring functionally associated with the hinge.

43. The flapper valve of claim 42 wherein the flapper is comprised of non-metallic material.

44. The flapper valve of claim 43 wherein the non-metallic material is comprised of fiber-reinforced thermoset, fiber reinforced thermoplastic, or structural grade plastic.

45. A cross-flow apparatus comprising:

a hollow mandrel having an inner diameter defining a passage therethrough;

a packing element arranged about the mandrel;
a valve functionally associated with the mandrel for selectively controlling flow of fluids through the passage; and
a central member within the passage of the mandrel, the central member being selectively releaseable from the apparatus.

46. The cross-flow apparatus of claim 45 wherein the central member is releaseably attached to the mandrel by a release mechanism.

47. The apparatus of claim 46 wherein the release mechanism is comprised of shear screws.

48. The apparatus of claim 47 wherein the release mechanism is comprised of shear rings, adjustable spring-loaded detent pins, or rupture disks.

49. The apparatus of claim 45 wherein a central member is adapted to seal the passage of the apparatus against fluid bypass when the central member is within the mandrel, the passage allowing fluid flow through the apparatus when the central member is released from the mandrel.